



Colorado Department  
of Public Health  
and Environment



August 15, 2005

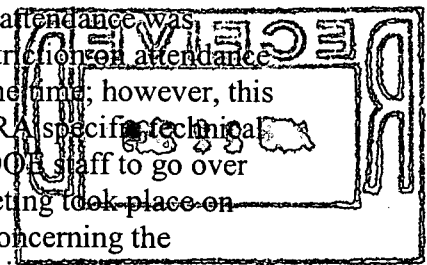
Mr. Bud Hart, President  
Woman Creek Reservoir Authority  
9500 Civic Center Drive  
Thornton, Colorado 80229

Dear Mr. Hart:

Thank you for your letter of July 27, in which you forwarded technical questions concerning the Original Landfill Interim Measure/Interim Remedial Action (IM/IRA) and the Ground Water IM/IRA. Please see our responses to your technical question in Attachment 1 to this letter. A "Summary of QA/QC Field Tests" for the Original Landfill construction is included as Attachment 2.

We appreciate your desire to clarify outstanding issues and bring closure to the items identified. We have held meetings with staff from Westminster and Broomfield and the Woman Creek Reservoir Authority (WCRA) specifically to discuss their technical concerns and we continued to keep in mind the issues raised by them as we reviewed the Groundwater IM/IRA, the Original Landfill design and other documents of concern.

We participated in an extensive technical meeting on April 20 with personnel from these organizations and their consultants. At the cities' request, attendance was limited to technical staff to enable in-depth discussion. This restriction on attendance was unusual, in that we generally meet with all parties at the same time; however, this was an effort to maximize time for discussion of the cities'/WCRA specific technical issues. It is our understanding the cities/WCRA also met with DOE staff to go over their technical concerns shortly afterward. A third technical meeting took place on June 6 at the Broomfield City Hall to further discuss questions concerning the Groundwater IM/IRA and Original Landfill design. Present at this meeting were staff from the cities/WCRA and their consultants, as well as CDPHE, EPA and DOE/Kaiser-Hill. We have since issued comments and approved the Groundwater IM/IRA and as of this writing, construction of the Original Landfill Interim Measure is nearing completion.



ADMIN RECORD

Mr. Bud Hart

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At these meetings, technical staff from CDPHE and EPA have indicated that our agencies shared some of the same technical questions raised by the consultants retained by the cities and WCRA, and have been working toward achieving resolution during the design/construction phases.

If you have any further issues or questions, please contact us.

Sincerely,

*for Larry Kimmel*  
C. Mark Aguilar  
Rocky Flats Team Leader  
EPA

*Carl Spreng*  
Carl Spreng  
RFCA Project Coordinator  
CDPHE

*David A. Kruchek*  
David A. Kruchek  
Acting Rocky Flats  
Oversight Unit Leader  
CDPHE

cc:

John Rampe, DOE  
Dave Shelton, K-H  
Mark Sattelberg, USFWS  
David Abelson, RFCLOG  
Nancy McNally, City of Westminster  
Al Nelson, City of Westminster  
Shirley Garcia, City of Broomfield  
Administrative Record

## Attachment 1

We realize the cities may not have had access to the most current documents, including the final versions of the GW IM/IRA, 2005 IMP, and Original Landfill IM/IRA and Final Design. The responses provided below are based on the most recent information provided by the site.

**1. Groundwater Monitoring - areas around the OLF for GW monitoring have not been identified to our satisfaction**

One upgradient and three downgradient monitoring wells were selected with input from CDPHE and EPA personnel. In addition, an AOC monitoring well is located approximately 200 to 300 feet due east and downgradient of the OLF. These monitoring locations have been presented in the Final Groundwater IM/IRA, July 2005 and the Final OLF IM/IRA, April 2005.

**2. Groundwater Screening Process – eliminates several AOIs and corrective actions based on SWPRGs**

The screening process was revised in the Final GW IM/IRA. In addition, Appendix E in the Final GW IM/IRA presents a discussion on the mobility of Pu and Am in the environment. Based on comments received on the Draft GW IM/IRA, the RAO utilizing SWPRGs has been deleted (Final GW IM/IRA, Section 11, page 116).

**3. Groundwater Sampling Pu and Am – DOE screens out Pu and Am and does [not] address their impact on groundwater and surface water**

The 2005 IMP includes newly installed monitoring wells downgradient of buildings 371 and 771. Groundwater monitoring for Pu and Am will be performed in monitoring wells downgradient of buildings 371, 771 and 774. In addition, there are downgradient surface water monitoring stations that will be sampled for Pu and Am.

**4. Groundwater Lower Aquifer – no deep aquifer monitoring is proposed - Data should be provided to validate the assumption**

This issue is adequately addressed in the Final GW IM/IRA in Section 11, pages 119 and 120, as well as in Appendix A. The agencies concur that there is no significant connection between the deep aquifer and the shallow contaminated aquifer.

**11. Woman Creek Surface Water Management – sources of surface water and groundwater contamination should be sampled and treated prior to entering Woman Creek**

Where feasible or practicable, identified sources of contamination have been remediated or eliminated by accelerated actions, such as the OLF, and 903 Pad and Lip Area soil remediation project.

In addition, monitoring locations are located throughout the Woman Creek drainage for the purpose of identifying potential releases to Woman Creek. To list a few, GS59 (POM5) and SW027 (POE3) are located upgradient of Pond C2 to measure potential contamination sources that may enter Woman Creek. In addition, GS01 (POC1) and GS31 (POC5) are located downgradient of Pond C2 and serve to monitor compliance with surface water quality standards. These stations would provide information on the concentration of potential contamination in the Woman Creek drainage and possibly leaving the site. In addition, the Woman Creek Reservoir was constructed to protect public water supplies from any potential releases.

**12. Woman Creek Surface Water Management – reservoirs should be operated to release small batches of water**

As stated in your letter, this issue appears to be adequately addressed by DOE and the cities are awaiting documentation.

**13. Woman Creek Sediment and Drainage Characterization**

The sediment in the C-series ponds has recently been sampled and some of the preliminary results have been received. The site has also recently completed sediment sampling in the A and B-series ponds. The surface water-sampling network is currently being evaluated for adequacy and coverage (FY 2005 IMP).

**14. Woman Creek Drainage Maintenance – disturbed areas in the IA should be revegetated to control erosion**

The agencies concur with this comment and DOE's response that revegetation and erosion control practices are being implemented.

**15. Woman Creek – surface water modeling adequacy**

The State reviewed the SWWB model, and the results of the modeling effort were accepted as a "reasonable" model for a good estimate of the range of expected hydrologic behavior.

**20. Regulatory requirements. "does not consider installation of a landfill closure consistent with...RCRA as is applicable to the site."**

The Original Landfill was closed in 1968. RCRA Subtitle C applies to landfills in existence on November 19, 1980. Due to the effective dates of operation, RCRA requirements are not "applicable" at this site but were deemed "relevant and appropriate." Accordingly, the ARARs analysis evaluated each requirement as to relevancy and appropriateness to the site.

**21. Proposed landfill closure does not contain or isolate the waste from groundwater.**

The intent of the remedy is to prevent direct contact with contents, control erosion caused by stormwater run-on and run-off, and minimize the need for maintenance. Groundwater moving through the landfill is monitored at three (3) downgradient wells and one (1) upgradient well, as per RCRA regulations. The three downgradient wells are designated as compliance points. Surface water is also monitored for the complete suite of contaminants.

The landfill cover was designed to function with minimum maintenance, promote drainage and minimize erosion or abrasion of the cover, accommodate settling and subsidence so that the cover's integrity is maintained. In addition, the closed landfill will be subject to a long term monitoring and maintenance program with specific compliance requirements.

**22. Stability of the landfill and buttress (area is in landslide and floodplain area, flood/integrity of buttress)**

These two concerns were identified by regulators early in the process; an additional geotechnical investigation was required and performed in 2004; calculations of flood level heights were also performed. The final design incorporates measures to protect the landfill cover (subgrade compaction to avoid subsidence) and buttress (reducing slope to 3:1 and toe reinforcement in the lower 30 ft).

The design takes into consideration that the Original Landfill is in an area prone to landslides and that the toe of the "buttress" will be in the floodplain in a major flood event. To provide adequate slope stability, a substantial earthen buttress was designed and constructed to stabilize the re-graded landfill slope. To provide for scour resistance of the toe of the buttress (not the landfill) that may be inundated, an analysis was made to determine the high-water level due to a 100-year storm event. Based on this analysis, the design provided for reinforcement of the portion of the toe of the buttress slope with heavy duty permanent erosion protection. This protection was extended above the required high-water level to provide an additional safety factor.

**25. Upstream/downstream contamination (many contaminants monitored downgradient but not monitored upgradient....)**

EPA is in the process of sampling and testing the surface water and sediment in Woman Creek at 10 locations in the immediate vicinity of the OLF.

**26. VOC Fate and Transport modeling (no specifics to the model, no sensitivity analysis)**

Given that the 3 downgradient monitoring wells are designated as points of compliance, and will give an actual account of the remedy performance, it was not necessary to further elaborate on the VOC model, as any model is theoretical.

Additional details are available and will be provided as requested. However, due to the inherent limitations of contaminant transport modeling in general, it is expected that additional modeling will not provide any new information. The actual performance of the closed landfill will be monitored in the long term monitoring plan. The five year review will assess the results and evaluate the appropriateness of the remedy. Specifically, groundwater, surface water, sediment, erosion loss, and vegetation will be all monitored in accordance with an approved plan. If monitoring of the closed landfill indicates an impact that exceeds regulatory criteria, additional actions will be implemented.

**27. Stability analysis (no evaluation of soil hydraulic properties)**

This concern was identified by the regulators. Evaluation of soil hydraulic properties and groundwater/hydrostatic forces was required as part of the calculations for the final design. These were all evaluated and considered in the stability analysis. This information can be found in the final design documents.

**28. OLF Cover QA/QC (lack of criteria for compaction levels, soil testing, no identified QA/QC hold points)**

We believe the commenter did not have access to the final design documents. The buttress foundation was identified as a QA/QC hold point; soil quality and compactibility are described in detail in specifications.

QA/QC is a necessary and an integral component of this project and was implemented in accordance with EPA and CDPHE guidance. A summary table of QA/QC testing performed for the project is attached. Supporting data are in the Construction Completion Report (under preparation). In addition, QA/QC personnel were on-site every day observing the progress of construction.

The key hold point required specific approval prior to proceeding with construction. The foundation excavation of the buttress fill needed approval prior to placement of buttress fill on this foundation. Other significant construction

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**TABLE 6.1**  
**SUMMARY OF QA/QC FIELD TESTS**

| Quality Control Item     | QA/QC Item  | QC Action                   | QA Action   | Total QC Tests Taken  | Total QA Tests Taken                         | Total Material Placed                                    |
|--------------------------|---|-----------------------------|-------------|---|--|--|
| Regrade & Cover Material | Atterberg Limits-<br>(ASTM D 4318);                                       | 1/6,500 cy                  | 1 per 20 QC | 8 Regrade Including:<br>4 RFA<br>4 Pit Fines<br>8 Cover (RFA) | 2 Regrade Including:<br>1 RFA<br>1 Pit Fines | 44,000 cy<br>Regrade Fill<br>39,126 cy<br>RFA Cover Soil |
|                          | Sieve Analysis<br>(with USCS Classification)<br>ASTM D 422<br>ASTM D 5519 | 1/6,500 cy                  | 1 per 20 QC | 8 Regrade Including:<br>4 RFA<br>4 Pit Fines<br>2 Cover (RFA) | 2 Regrade Including:<br>1 RFA<br>1 Pit Fines | 44,000 cy<br>Regrade Fill<br>39,126 cy<br>RFA Cover Soil |
| Buttress Fill Material   | Field Density<br>ASTM D 2922  | 1/5,000 sqft/lift           | 1 per 20 QC | 280<br>(+ Retests)  | 14 All of which passed                       | 1,400,000 sqft/lift                                      |
|                          | Field Density Verification<br>ASTM D 1556<br>ASTM D 2167                  | 1 per 20 Field Density Test | N/A         | 14  | 1  | 1,400,000 sqft/lift                                      |
|                          | Atterberg Limits<br>ASTM D 4318   | 1/6,500 cy                  | 1 per 20 QC | 9   | 3  | 44,854 cy  |
|                          | Sieve Analysis<br>(with USCS Classification)<br>ASTM D 422<br>ASTM D 5519 | 1/6,500 cy                  | 1 per 20 QC | 9   | 3  | 44,854 cy  |
|                          | Standard Proctor-<br>ASTM D 698   | 1/6,500 cy                  | 1 per 20 QC | 9   | 3  | 44,854 cy  |
| Drain Rock               | Sieve Analysis<br>(with USCS Classification)<br>ASTM D 136<br>ASTM D 5519 | 1/6,500 cy                  | 1 per 20 QC | 4   | 1  | 6,459 cy   |
| Geotextile               | Unit Weight<br>ASTM D 5261  | 1/100,000 sqft              | 1 per 20 QC | 2 MQC Submittals  | 5  | 153,000 sqft   |

- QA was performed by Tetra Tech
- QC was performed by Golder and Associates
- Material placed was determined from survey information with the exception to the regrade fill which was estimated from truck loads.